

REMARKS

By the foregoing amendment, Applicant has cancelled claims 1-27 without disclaimer or prejudice in favour of new claims 28-61.

The present invention relates to polymer additives and is particularly applicable to additives which reduce the coefficient friction of polyester polymer such as polyethylene terephthalate (PET).

Polyesters such as PET, are an important class of plastics material widely used in the manufacture of molded polyester articles and films. The key advantages of using polyesters, such as PET, are:

- High clarity
- Light weight
- Good processability
- Excellent barrier properties against oxygen and carbon dioxide
- Good impact resistance
- Tough – virtually unbreakable
- Economic.

Largely as a consequence of the above properties, the most important plastic application for PET homopolymer and copolymers is in the manufacture of bottles.

PET bottles are produced predominantly using a two stage stretch blow moulding process. Firstly a preform is produced by injection moulding. This is a relatively thick – walled part with the neck features moulded during this process. The preform is then reheated in a reheat blow machine which stretches the preform by a stretching pin and inflates it by blowing air into the mould to give the desired shape. This gives a biaxially orientated container which provides improved properties such as clarity and gas barrier performance. This is especially important for carbonated drink containers..

PET bottles may also be manufactured by injection blow moulding which is a 2-stage technique performed on a single machine. The preform is injection moulded and whilst still hot is moved to a blowing station where it is blown up to the desired shape. This is the preferred technique for small containers requiring specific neck

detail or finish and produces containers that are less biaxially orientated.

A major difficulty in fabricating articles from PET is the relatively high coefficient of friction of the polymer. In the manufacture of bottles this problem can manifest itself in a number of ways:

- Less than optimum packing density when performs are packed into a box with concomitant higher storage and transportation costs.
- Poor flow on conveying equipment and hence reduced throughput
- Surface defects due to poor scratch resistance.

There is thus a need for an effective additive system for PET which reduces the coefficient of friction of the polymer and thus overcomes the above deficiencies.

Additives that are effective in reducing the coefficient of friction of polymers are known in the industry as slip additives. However, in order to be acceptable for beverage containers, the fabricated PET bottle must exhibit low colour and high clarity, with low taste and odour and be non-toxic. This imposes other important requirements on a slip agent in addition to its friction-reducing properties.

The conventional slip agents of choice in the plastics industry are fatty amides. These additives are widely used in polyolefins such as polyethylene, polypropylene, and related copolymers. Fatty amides employed as slip additives are generally manufactured from fatty acids containing between 16 and 22 carbon atoms and are characterised by a variety of structural forms:

- Primary amides which can be either monounsaturated (as exemplified by erucamide and oleamide) or saturated (as exemplified by stearamide and behenamide)
- Secondary amides as exemplified by stearyl erucamide and oleyl palmitamide
- Bis amides such as ethylene bis stearamide.

In view of their widespread usage in polymer systems, it might appear logical to consider fatty amides as slip agents for polyesters such PET. However we have established that although fatty amides do demonstrate some friction reducing

properties in PET, the lowering of the coefficient of friction is much less than in polyolefins. Moreover all amides cause discolouration in injection moulded PET which will severely restrict their utility in this polymer.

Those skilled in the art will be aware that separate and different classes of polymers have widely different chemical compositions and different molecular architectures. Thus, polyester polymers such as PET cannot be compared with polyvinyl chloride (PVC), polyamides such as nylon, or other classes of polymer. Not only do they behave differently as polymers, but different slip agents are required with different polymer classes. That is to say, one cannot extrapolate or predict how a particular compound, or mixture of compounds, will perform as slip agents in one agent based on its performance as a slip agent in a different class of polymers.

Conventional slip agent technology cannot therefore be readily applied to in PET. This is particularly the case in bottle (preform) manufacture where in addition to low coefficient of friction, other strict requirements with regard to colour, taste and odour must be met.

Thus the present invention provides a new class of slip additive as defined by the attached claims. Reconsideration of the previous rejections in view of the foregoing amendment and remarks is respectfully requested in view of the following comments.

The previous claim rejections and the rejection of claim 18 under 35 U.S.C. §112, second paragraph are deemed moot in view of the cancellation of these claims.

Reconsideration of the various prior art rejections are respectfully requested.

Of the cited references, i.e., Takayama et al (U.S. Patent No. 6,326,435) or Kano (U.S. Patent No. 5,998,005) do not anticipate the claimed invention. It is clear from the foregoing amendment that the slip agent comprises a composition which is neither taught or made obvious by either of Takayama et al or Kano and thus these references fail to anticipate new claims 28-61 under 35 U.S.C. §102(b).

All the claims require a composition; a polyester incorporating the

composition; a method incorporation the composition; and articles made from a composition; which include, *inter alia*, a mixture of aliphatic esters as a slip agent which are nowhere taught or suggested in the cited references. Accordingly, Applicants respectfully submit that the new claims avoid the teachings of the prior art both under 35 U.S.C. §102 as well as 35 U.S.C. §103 and accordingly, withdrawal of the rejections and pass of the application to issue are respectfully requested.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 14-1437, under Order No. 8738.003.US0000.

Respectfully submitted,



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